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REMARKS

Claims 1 to 10 are currently pending in the present application. Claims 2 to 7 and 10 are amended herein. No new matter has been added.

Claim 10 stands rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Claim 10 has been amended to claim a computer–readable storage medium storing a program for causing a computer to perform having instructions for carrying out a method as claimed in claim 1. Applicants assert that claim 10 is now properly directed to statutory subject matter. Reconsideration and withdrawal of the rejections under 35 U.S.C. 101 is respectfully requested.

Claims 1, 4 to 6 and 8 to 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,729,379 to Ohe (hereinafter "Ohe").

Applicants respectfully submit that Ohe does not expressly or inherently disclose all of the elements set forth in independent claim 1. Thus, Ohe does not anticipate claim 1 or claims 4 to 6 and 8 to 10, which depend directly or indirectly therefrom.

Claim 1 is directed to a method of determining a corresponding image for a reference image from an image sequence of a moving object by means of a first and a second motion signal, in which the first and the second motion signal represent the respective variation in time of the states of motion of a first motion and a second motion of the object, the image sequence represents the first motion of the object as a sequence of images of states of motion, the reference image represents a state of motion from the second object motion and is acquired at a reference instant during the second motion of the object, including the following steps: a. determining a similarity function by way of a similarity comparison of the first and the second motion signal, b. determining a correspondence instant in the first motion signal by means of the similarity function, the correspondence instant corresponding to the acquisition instant of the reference image

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from the second motion signal, and c. determining, using the first motion signal, that image of the image sequence whose acquisition instant corresponds at least approximately to the correspondence instant.

Ohe fails to disclose a method of determining a corresponding image for a reference image from an image sequence of a moving object, as claimed in claim 1. Specifically, Ohe fails to disclose a means for determining a correspondence instant in the first motion signal by means of the similarity function, the correspondence instant corresponding to the acquisition instant of the reference image from the second motion signal, a means for determining, using the first motion signal, that image of the image sequence whose acquisition instant corresponds at least approximately to the correspondence instant, as clearly claimed by claim 1.

Rather, Ohe discloses an X-ray examination apparatus for cardiological examinations in which two X-ray image sequences of the beating heart are acquired. A contrast medium is injected into the blood vessels of the heart during the acquisition of one of the two sequences. During a subsequent step, the two sequences are subtracted from one another, that is, one image after the other, so that only the vessels filled with the contrast medium are reproduced with a minimum amount of background in the resultant differential sequence. To this end, the two image sequences must be aligned relative to one another in such a manner that the images that represent the same state of motion are subtracted from each image sequence. This is achieved by the acquisition of a respective electrocardiographic (EKG) signal by means of an electrocardiograph in parallel with the acquisition of the two image sequences. In both ECGs two successive R deflections are determined whereby the two ECGs are aligned relative to one another. If the time elapsing between the two R deflections in the two ECGs differ, this time difference is compensated by linear interpolation, so that the images acquired between the R deflections of the two associated image sequences can be associated with one another.

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However, the method of Ohe gives rise to undesirable and disturbing artifacts in
the differential space not present when the method of claim 1 is employed. The Ohe
disclosure is limited in that only one reference instant is used for the cardiac cycle, thus
the image sequences are aligned with one another at one instant only, so that differences
between the two ECG signals in respect of the duration of the overall cardiac cycle on the
one hand and in respect of the expansion or compression of individual segments of the
motion of the heart on the other hand are not taken into account. Ohe fails to disclose a
method employing a first and a second motion figure, as clearly claimed in claim 1.

Accordingly, for at least this reason, independent claim 1 is patentable over Ohe.
Since claims 4 to 6 and 8 to 10 depend from claim 1 and provide further features, these
claims are clearly distinguishable over Ohe for at least the reasons discussed.
Accordingly, the rejections under 35 U.S.C. § 102(b) of claims 1 and claims 4 to 6 and 8
to 10 should be withdrawn and claims 1 and claims 4 to 6 and 8 to 10 should be allowed.

Claims 2, 3 and 7 stand rejected by the Action under 35 U.S.C. § 103(a) as being
obvious over Ohe in view of Vullings (*Automated ECG segmentation with Dynamic Time
Warping*) (hereinafter "Vullings") and further in view of Beier (*Advanced Subtraction
Angiography: Mask selection and Image Registration*) (hereinafter "Beier") and further
in view of U.S. Patent No. 6,228,030 to Urbano et al. (hereinafter "Urbano").

Neither Ohe nor Vullings nor Beier nor Urbano, taken either alone or in
combination, teaches the invention as set forth in claims 2, 3 and 7. Claims 2, 3 and 7
depend from claim 1 and, as such, include the various limitations thereof. As discussed
above, Ohe does not disclose a method of determining a corresponding image for a
reference image from an image sequence of a moving object by means of a first and a
second motion signal, in which the first and the second motion signal represent the
respective variation in time of the states of motion of a first motion and a second motion
of the object, the image sequence represents the first motion of the object as a sequence
of images of states of motion, the reference image represents a state of motion from the

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second object motion and is acquired at a reference instant during the second motion of the object, including the following steps: a. determining a similarity function by way of a similarity comparison of the first and the second motion signal, b. determining a correspondence instant in the first motion signal by means of the similarity function, the correspondence instant corresponding to the acquisition instant of the reference image from the second motion signal, and c. determining, using the first motion signal, that image of the image sequence whose acquisition instant corresponds at least approximately to the correspondence instant.

As acknowledged, Vullings also fails to suggest such a method. Rather, Vullings is directed to a single lead method based on dynamic time warping (DTW) for detecting an abnormal conduction of the heart. Vullings fails to disclose a means for determining a correspondence instant in the first motion signal by means of the similarity function, the correspondence instant corresponding to the acquisition instant of the reference image from the second motion signal, a means for determining, using the first motion signal, that image of the image sequence whose acquisition instant corresponds at least approximately to the correspondence instant, as clearly claimed by claim 1. The Action further acknowledges that Beier fails to disclose a method of determining a corresponding image for a reference image as claimed in claim 1. Rather, Beier is directed to an image registration algorithm for estimating displacements in numerous local image regions wherein the resulting motion pattern is used to compute a new warped image with maximum congruence to provide improved assessment of coronary vessels.

Moreover, Urbano fails to disclose the method of determining a corresponding image for a reference image as claimed in claim 1. Specifically, the method of Urbano fails to disclose a means for determining a correspondence instant in the first motion signal by means of the similarity function, the correspondence instant corresponding to the acquisition instant of the reference image from the second motion signal, a means for determining, using the first motion signal, that image of the image sequence whose

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acquisition instant corresponds at least approximately to the correspondence instant, as clearly claimed by claim 1. Rather, Urbano is directed to a method of using ultrasound for locating the time of occurrence of a predetermined event in a physiologic cycle associated with an anatomical object of a subject's body. According to the Urbano disclosure, echoes are produced from transmission of ultrasound energy into the anatomical object are processed by an image frame acquisition device to produce a series of image frames, each image frame including data representing an image of at least a portion of the anatomical object at a given time. A difference is determined between the current image frame and at least one preceding image frame, a frame correlation coefficient is output based upon the difference. A time of occurrence is located at the instance of time when the frame correlation coefficient falls below a predetermined value, or when the rate of change of the frame correlation coefficient exceeds a predetermined value.

Since the combination of Ohe, Vullings, Beier and Urbano does not disclose or suggest all the limitations of claim 1, it does not render claim obvious. Since claims 2, 3 and 7 depend from claim 1 and add further features thereto, the cited combination does not render obvious claims 2, 3 and 7. Accordingly, the rejections under 35 U.S.C. § 103(a) of claims 2, 3 and 7 should be withdrawn and claims 2, 3 and 7 should be allowed.

Conclusion

In view of the foregoing, Applicants respectfully submit that the specification, the drawings and all claims presented in this application are currently in condition for allowance. Accordingly, Applicants respectfully request favorable consideration and that this application be passed to allowance.
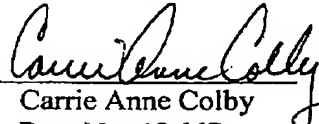
Should any changes to the claims and/or specification be deemed necessary to place the application in condition for allowance, the Examiner is respectfully requested to contact the undersigned to discuss the same.

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Applicants' representative believes that this response is being filed in a timely manner. In the event that any extension and/or fee is required for the entry of this amendment the Commissioner is hereby authorized to charge said fee to Deposit Account No. 14-1270. An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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